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What is claimed is:

1. A method for forming a coating comprising the steps of: providing a substrate; and electrophoretically forming the coating using a dispersion of ceria nanoparticles; such that a coating comprising nanoceria is formed on at least a portion the substrate.
2. The method of claim 1, wherein the electrophoretic forming step is carried out by applying a voltage having a DC component and/or an AC component to the substrate and at least one counter-electrode, wherein the voltage is continuous, pulsed, or arbitrarily increasing or decreasing with time.
3. The method of claim 2, wherein at least one counter-electrode comprises two counter-electrodes.

4. The method of claim 1, wherein the cerium oxide nanoparticles comprise cerium in the 3+ oxidation state or 4+ oxidation state, or both.

5. The method of claim 1, further comprising after the nanoceria coating has been formed, heating the substrate to 200-450° C. for 1-2.5 hr.

6. The method as recited in claim 1, wherein one electrode is a Ti electrode and two electrodes are nonconsumable counter-electrodes.

7. A coating by the process of claim 1, further characterized by nanoceria having a surface cerium 3+/4+ oxidation state ratio such that the coating exhibits catalase mimetic activity, superoxide dismutase mimetic activity, or both.

8. The coating of claim 7, comprising a coating for a prosthesis.

9. A method of conducting an orthopedic procedure, the method comprising

obtaining an implant comprising a substrate having one or more nanoceria coatings coated at least partially thereon, wherein the one or more nanoceria coatings comprise surface cerium having a 3+/4+ oxidation state ratio such that the one or more nanoceria coatings exhibit catalase mimetic activity, superoxide dismutase mimetic activity, or both; and

implanting the implant in a subject in need thereof.

10. The method of claim 9, wherein the implanting comprises contacting the implant with bone tissue.

11. A method of reducing osteolysis in a subject in need, the method comprising administering nanoceria comprising catalase activity, superoxide dismutase activity, or both, to an injury, defect or disease site of bone in the subject.

12. A bone paste comprising nanoceria comprising catalase activity, superoxide dismutase activity, or both, and at least one of an osteoinductive or osteoconductive component.

13. The bone paste of claim 12, further comprising a suitable carrier component.

14. The bone paste of claim 12 further comprising a bone paste additive component.

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